

December 06, 2016

Meagan E. Ormand
Golder Associates Inc.
2108 W. Laburnum Ave.
Suite 200
Richmond, VA 23227

RE: Project: Bremo Monthly Process
Pace Project No.: 92321819

Dear Meagan Ormand:

Enclosed are the analytical results for sample(s) received by the laboratory on December 05, 2016. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Nicole Gasiorowski
nicole.gasiorowski@pacelabs.com
Project Manager

Enclosures

cc: Ron DiFrancesco, Golder Associates Inc.
Arielle Green, Golder Associates Inc.
Martha Smith, Golder Associates Inc.
Mike Williams, Golder Associates Inc



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: Bremo Monthly Process

Pace Project No.: 92321819

Ormond Beach Certification IDs

8 East Tower Circle, Ormond Beach, FL 32174
Alabama Certification #: 41320
Connecticut Certification #: PH-0216
Delaware Certification: FL NELAC Reciprocity
Florida Certification #: E83079
Georgia Certification #: 955
Guam Certification: FL NELAC Reciprocity
Hawaii Certification: FL NELAC Reciprocity
Illinois Certification #: 200068
Indiana Certification: FL NELAC Reciprocity
Kansas Certification #: E-10383
Louisiana Certification #: FL NELAC Reciprocity
Louisiana Environmental Certificate #: 05007
Maryland Certification: #346
Michigan Certification #: 9911
Mississippi Certification: FL NELAC Reciprocity
Missouri Certification #: 236
Montana Certification #: Cert 0074

Nebraska Certification: NE-OS-28-14
Nevada Certification: FL NELAC Reciprocity
New York Certification #: 11608
North Carolina Environmental Certificate #: 667
North Carolina Certification #: 12710
Oklahoma Certification #: D9947
Pennsylvania Certification #: 68-00547
Puerto Rico Certification #: FL01264
South Carolina Certification: #96042001
Tennessee Certification #: TN02974
Texas Certification: FL NELAC Reciprocity
US Virgin Islands Certification: FL NELAC Reciprocity
Virginia Environmental Certification #: 460165
Wyoming Certification: FL NELAC Reciprocity
West Virginia Certification #: 9962C
Wisconsin Certification #: 399079670
Wyoming (EPA Region 8): FL NELAC Reciprocity

Eden Certification IDs

205 East Meadow Road Suite A, Eden, NC 27288
North Carolina Drinking Water Certification #: 37738

North Carolina Wastewater Certification #: 633
Virginia/VELAP Certification #: 460025

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SAMPLE ANALYTE COUNT

Project: Bremo Monthly Process

Pace Project No.: 92321819

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
92321819001	T3-161204-1150-S3	ASTM D4282-02	KCE	1	PASI-E
		EPA 200.7	RVK	8	PASI-O

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PROJECT NARRATIVE

Project: Bremo Monthly Process

Pace Project No.: 92321819

Method: ASTM D4282-02

Description: Cyanide, Free

Client: Golder_Dominion_Bremo

Date: December 06, 2016

General Information:

1 sample was analyzed for ASTM D4282-02. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Bremo Monthly Process

Pace Project No.: 92321819

Method: EPA 200.7

Description: 200.7 MET ICP

Client: Golder_Dominion_Bremo

Date: December 06, 2016

General Information:

1 sample was analyzed for EPA 200.7. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 200.7 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Bremo Monthly Process

Pace Project No.: 92321819

Sample: T3-161204-1150-S3		Lab ID: 92321819001	Collected: 12/04/16 11:50	Received: 12/05/16 14:20	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Cyanide, Free		Analytical Method: ASTM D4282-02						
Cyanide, Free	ND	mg/L	0.050	1		12/06/16 10:30	57-12-5	
200.7 MET ICP		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7						
Aluminum	255	ug/L	100	1	12/06/16 12:37	12/06/16 16:24	7429-90-5	
Barium	300	ug/L	10.0	1	12/06/16 12:37	12/06/16 16:24	7440-39-3	
Beryllium	ND	ug/L	1.0	1	12/06/16 12:37	12/06/16 16:24	7440-41-7	
Boron	1760	ug/L	50.0	1	12/06/16 12:37	12/06/16 16:24	7440-42-8	
Cobalt	ND	ug/L	10.0	1	12/06/16 12:37	12/06/16 16:24	7440-48-4	
Iron	ND	ug/L	250	1	12/06/16 12:37	12/06/16 16:24	7439-89-6	
Molybdenum	188	ug/L	10.0	1	12/06/16 12:37	12/06/16 16:24	7439-98-7	
Vanadium	ND	ug/L	10.0	1	12/06/16 12:37	12/06/16 16:24	7440-62-2	

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QUALITY CONTROL DATA

Project: Bremo Monthly Process

Pace Project No.: 92321819

QC Batch:	339594	Analysis Method:	ASTM D4282-02
QC Batch Method:	ASTM D4282-02	Analysis Description:	ASTM D4282 Free Cyanide
Associated Lab Samples:	92321819001		

METHOD BLANK: 1883248 Matrix: Water

Associated Lab Samples: 92321819001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Cyanide, Free	mg/L	ND	0.050	12/06/16 10:30	

LABORATORY CONTROL SAMPLE: 1883249

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cyanide, Free	mg/L	.1	0.10	101	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1883250 1883251

Parameter	Units	92321816001 Result	MS		MSD		MS		MSD		% Rec Limits	RPD	Qual
			Spike Conc.	Conc.	Spike Conc.	Conc.	% Rec	% Rec					
Cyanide, Free	mg/L	ND	.1	.1	0.098	0.10	92	96	90-110	3			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALITY CONTROL DATA

Project: Bremo Monthly Process
Pace Project No.: 92321819

QC Batch:	336641	Analysis Method:	EPA 200.7
QC Batch Method:	EPA 200.7	Analysis Description:	200.7 MET
Associated Lab Samples:	92321819001		

METHOD BLANK: 1802996 Matrix: Water
Associated Lab Samples: 92321819001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Aluminum	ug/L	ND	100	12/06/16 16:00	
Barium	ug/L	ND	10.0	12/06/16 16:00	
Beryllium	ug/L	ND	1.0	12/06/16 16:00	
Boron	ug/L	ND	50.0	12/06/16 16:00	
Cobalt	ug/L	ND	10.0	12/06/16 16:00	
Iron	ug/L	ND	250	12/06/16 16:00	
Molybdenum	ug/L	ND	10.0	12/06/16 16:00	
Vanadium	ug/L	ND	10.0	12/06/16 16:00	

LABORATORY CONTROL SAMPLE: 1802997

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Aluminum	ug/L	2500	2510	100	85-115	
Barium	ug/L	250	259	104	85-115	
Beryllium	ug/L	25	25.8	103	85-115	
Boron	ug/L	2500	2550	102	85-115	
Cobalt	ug/L	250	252	101	85-115	
Iron	ug/L	2500	2610	104	85-115	
Molybdenum	ug/L	250	250	100	85-115	
Vanadium	ug/L	250	254	101	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1802998 1802999

Parameter	Units	92321816001		MS		MSD		MS		MSD		MS		MSD		% Rec		% Rec		% Rec		% Rec		Limits		RPD		Qual	
		Units	Result	Conc.	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	MS % Rec	MSD % Rec	MS % Rec	MSD % Rec	MS % Rec	MSD % Rec	MS % Rec	MSD % Rec	MS % Rec	MSD % Rec	MS % Rec	MSD % Rec	MS % Rec	MSD % Rec	MS % Rec	MSD % Rec	MS % Rec	MSD % Rec	MS % Rec	MSD % Rec
Aluminum	ug/L	ND	2500	2500	2630	2640	102	103	70-130	0																			
Barium	ug/L	339	250	250	608	599	108	104	70-130	1																			
Beryllium	ug/L	ND	25	25	25.6	26.4	102	105	70-130	3																			
Boron	ug/L	1900	2500	2500	4480	4580	103	107	70-130	2																			
Cobalt	ug/L	ND	250	250	248	251	99	100	70-130	1																			
Iron	ug/L	ND	2500	2500	2690	2690	105	105	70-130	0																			
Molybdenum	ug/L	239	250	250	488	489	100	100	70-130	0																			
Vanadium	ug/L	ND	250	250	261	263	102	103	70-130	1																			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALIFIERS

Project: Bremo Monthly Process

Pace Project No.: 92321819

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

Acid preservation may not be appropriate for 2 Chloroethylvinyl ether.

A separate vial preserved to a pH of 4-5 is recommended in SW846 Chapter 4 for the analysis of Acrolein and Acrylonitrile by EPA Method 8260.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-E Pace Analytical Services - Eden

PASI-O Pace Analytical Services - Ormond Beach

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE


Project: Bremo Monthly Process

Pace Project No.: 92321819

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
92321819001	T3-161204-1150-S3	ASTM D4282-02	339594		
92321819001	T3-161204-1150-S3	EPA 200.7	336641	EPA 200.7	336709

REPORT OF LABORATORY ANALYSIS

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	Document Name:	Document Revised: May 24, 2016
	Sample Condition Upon Receipt(SCUR)	Page 1 of 2
	Document No.: F-MEC-CS-009-Rev.03	Issuing Authority: Pace Mechanicsville Quality Office

Page 2 of 2 for Internal Use ONLY

Sample Condition Upon Receipt

Client Name:

Project #:

WO# : 92321819



Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client
☐ Commercial ☒ Pace ☐ Other: _____

Custody Seal Present? ☒ Yes ☐ No Seals Intact? ☒ Yes ☐ No

Packing Material: ☒ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other: _____

Thermometer: ☒ RMD001 ☐ _____ Type of Ice: ☒ Wet ☐ Blue ☐ None

Correction Factor: 0.0°C Cooler Temp Corrected (°C): 2.5

Date/Initials Person Examining Contents: 12-5-16
RSB
 Biological Tissue Frozen? ☐ Yes ☐ No ☐ N/A

Temp should be above freezing to 6°C

USDA Regulated Soil (☐ N/A, water sample)

Did samples originate in a quarantine zone within the United States: CA, NY, or SC (check maps)?

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☐ No

☐ Yes ☐ No

	Chain of Custody Present?	Samples Arrived within Hold Time?	Short Hold Time Analysis (<72 hr.)?	Rush Turn Around Time Requested?	Sufficient Volume?	Correct Containers Used?	-Pace Containers Used?	Containers Intact?	Samples Field Filtered?	Sample Labels Match COC?	-Includes Date/Time/ID/Analysis Matrix:	Comments/Discrepancy:
1.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<u>WW</u>	
2.												
3.												
4.												
5.												
6.												
7.												
8.												Note if sediment is visible in the dissolved container
9.												
10.												HNO ₃ pH<2 HCl pH<2 H ₂ SO ₄ pH<2 NaOH pH>12 NaOH/ZnOAc pH>9
11.												
12.												
13.												

CLIENT NOTIFICATION/RESOLUTION

Field Data Required? ☐ Yes ☐ No

Person Contacted: _____

Date/Time: _____

Comments/Sample _____

Discrepancy: _____

Project Manager SCURF Review: _____

RMG

Date: _____

12/6/16

Project Manager SRF Review: _____

RMG

Date: _____

12/6/16

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. Out of hold, incorrect preservative, out of temp, incorrect containers)

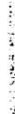
WO# : 92321819

PM: NMG Due Date: 12/08/16
CLIENT: 92_GolderAss

Item#	BP4U-125 mL Plastic Unp	BP3U-250 mL Plastic Unp	BP2U-500 mL Plastic Unp	BP1U-1 liter Plastic Unp	BP3S-250 mL Plastic H2SO4	BP3N-250 mL plastic HNO3	BP3Z-250 mL Plastic ZN Acetate	BP3C-250 mL Plastic NaOH	WGFU-Wide-mouthed Glass jar Unp	AG1U-1 liter Amber Unp	AG1H-1 liter Amber HCl	AG3U-250 mL Amber Unp	AG1S-1 liter Amber H2SO4	AG3S-250 mL Amber H2SO4	AG3A(DG3A)-250 mL Amber NH4Cl	DG9H-40 mL VOA HCl	VG9T-40 mL VOA Na2S2O3	VG9U-40 mL VOA Unp	DG9P-40 mL VOA H3PO4	VOAK (6 vials per kit) -5035	V/GK (3 vials per kit)-VPH/	SP5T-125 mL Sterile Plastic	SP2T-250 mL Sterile Plastic	BP3A-250 mL Plastic (NH2)	Cubitalner	VSGU-20 mL Scintillation vi	GN
1					1		2																				
2																											
3																											
4																											
5																											
6																											
7																											
8																											
9																											
10																											
11																											
12																											

pH Adjustment Log for Preserved Samples

Sample ID	Type of Preservative	pH upon receipt	Date preservation adjusted	Time preservation adjusted	Amount of Preservative added	Lot #



The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: 1 of 1

F-ALL-Q-020rev.08, 12-Oct-2007